1,131,377

PATENT SPECIFICATION 1,131,377

DRAWINGS ATTACHED.

Date of Application and filing Complete Specification:
24 Aug., 1967. No. 39084/67.

Application made in Germany (No. K60238 XII/47b) on 13 Sept., 1966.

Complete Specification Published: 23 Oct., 1968.

Index at Acceptance:—F2 A19; F2 U14.

Int. Cl.:—F 16 c 3/02.

COMPLETE SPECIFICATION.

Improvements in Bearing Assemblies for a Rotary Machine Element Mounted on Removable Pin Shaft.

We, KOCKS-WERMELSKIRCHEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, personally responsible Partner of the Firma Friedrich Kocks, of Freiligrathstrasse 1, Dusseldorf, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a bearing assembly for a rotary machine element mounted on a removable pin shaft in a bearing housing. The rotary machine element may be, for example, a gearwheel, a cable pulley wheel, a chain sprocket wheel, a flywheel or a hub on which is mounted another machine element. The pin shaft may be rotatable in which case the machine element is rotationally fixed relative to the shaft, or the shaft may be stationary in which case the machine element is rotatable on the shaft.

Driving mechanisms are often equipped with removable pin shafts to facilitate replacement of the bearings. However, in this operation difficulties are encountered in reinserting the shaft, because the rotary machine element must first of all be positioned co-axially with the rotation axis of the bearing assembly, either by hand or if the parts are heavy then by means of lifting tackle. The shaft is then inserted through the hole in the housing into the bore of the rotary element, which must all the time remain perfectly centred. This operation can hardly ever be done with the necessary accuracy, and the rotary element is usually ultimately centred by the introduction of the shaft itself, with resulting damage to the seating surfaces of the shaft and the element. Furthermore, the introduction of the shaft is in practice possible only by leaving a fairly loose fit between the machine element and the shaft, and consequently the machine element does not rotate true with any precision.

With the aim of overcoming this difficulty, according to the invention the rotary machine element and the bearing housing have on one of them a projection and on the other a corresponding recess, the rotary machine element being movable axially relative to the bearing housing so that if it is desired that the pin shaft be withdrawn from the bearing housing the rotary machine element can be moved to bring the projection into engagement with the recess so that the machine element is held co-axial with the axis of rotation of the bearing assembly while the pin shaft is out of the housing.

A narrow machine element, for example a narrow gearwheel, can be relied on to remain centred by this means, even after the shaft has been withdrawn, provided that a good engagement is ensured between the gearwheel and the bearing housing by a comparatively long projection mating with a comparatively long recess. On the other hand, for the case where the rotary machine element is fairly wide, in a preferred version of the invention the assembly includes means for holding the projection positively in engagement with the recess, this means also serving to provide the necessary axial displacement of the rotary machine element, an operation which can be performed by hand, without special means, only if the machine element is sufficiently light. This means preferably comprises a number of thrust screws which are inserted through the wall of the bearing housing parallel to the axis of the shaft.

[Price 4s. 6d.]

The centering projection could possibly consist of several pins which project from the one part in directions parallel to the axis of the bearing assembly and which engage in corresponding drillings in the other part. But this would require the rotary machine element to be rotated to the correct angular position before mating could be arranged. In the preferred version of the invention this necessity is avoided since the projection and the recess are cylindrical and co-axial with the rotation axis of the bearing assembly.

The re-insertion of the pin shaft into a bearing assembly in accordance with the invention presents no difficulties because the rotary machine element is already positioned co-axially with the shaft, having remained in this position throughout the operation of withdrawing the pin shaft without needing to be supported by hand or by a lifting tackle. The seating surfaces cannot be damaged during these operations even if the fit between the parts is a close one. A close fit is desirable to give the drive better running characteristics. If the rotary machine elements are gearwheels it is a particular advantage that they remain meshed with each other throughout the operations. Furthermore there is usually no need to open up the bearing housing completely. The invention is applicable to bearing assemblies in which the housing is split in the plane of the pin shaft, as well as to those which have non-split housings.

These examples of bearing assemblies in accordance with the present invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal section through a gearwheel drive constructed according to the invention, showing a removable rotary pin shaft in its operative position;

Figure 2 is a similar view to that shown in Figure 1, but showing the parts in position ready for the rotary pin shaft to be withdrawn;

Figure 3 is a longitudinal section through another drive constructed according to the invention, in which two individual gearwheels are fixed to a removable intermediate rotary pin shaft; and,

Figure 4 is a longitudinal section through a further drive constructed according to the invention, in which two individual gearwheels are fixed to a hub which itself rotates on a removable stationary pin shaft.

In the drive shown in Figure 1 a bearing housing 1 contains a removable rotary pin shaft 2, which rotates in the housing 1 in roller bearings 3. When this assembly is in operation, as represented in Figure 1, the two roller bearings 3 are retained axially by a collar 4 and a spacer ring 5, on the other hand, and by two cover plates 6 and 7, on the other hand. On the rotary pin shaft 2 there is mounted, between the collar 4 and the spacer ring 5, a gearwheel 8, which is keyed to the shaft by a key 9 in a groove.

On its outer face 10 the gearwheel 8 has a projecting cylindrical step 11 the external diameter of which is the same as the internal diameter of a drilling 12 in the housing 1 which accommodates the left-hand roller bearing 3. In the other wall of the housing 1, near the face 13 of the gearwheel 8, there is a circle of equally spaced drillings 14, the centre of the circle being on the axis of the assembly. When the drive is in operation these drillings are all sealed by short screws 15.

To remove the rotary pin shaft 2, for the purpose of replacing the bearings 3, the short screws 15 are first of all removed and replaced by thrust screws 16 (see Figure 2). The left-hand bearing cover 6 is then removed and the thrust screws 16 are screwed inwards to engage the face 13 of the gearwheel 8 and move the gearwheel up against the left-hand wall of the housing 1. In this movement the extension 11 enters the drilling 12, and finally the left-hand face 10 of the gearwheel 8 comes flush up against the face 17 of the left-hand wall of the housing 1. The rotary pin shaft 2 and the left-hand bearing 3 also take part in this movement. After removing the right-hand bearing cover 7, the rotary pin shaft 2 can be withdrawn towards the right, leaving the gearwheel 8 in place, firmly held by the thrust screws 16 and accurately centred in the housing 1 by the extension 11 in the recess 12. The bearings 3 can now be removed and replaced with new ones. After the rotary pin shaft 2 has been re-inserted, the thrust screws 16 are removed and the rotary pin shaft 2 is moved back towards the right to return the parts into the positions shown in Figure 1. The two cover plates 6 and 7 are then replaced.

The drive shown in Figure 3 differs from that shown in Figures 1 and 2 in that the extension 11, which serves for centering the rotary machine elements during periods when the rotary pin shaft 2 has been removed, is not in the form of a projection of a gearwheel, but is a projection of a bush 18 which is itself fixed to the rotary pin shaft 2. A further difference is that the recess which takes the projection 11 is in this case not simply a drilling in the housing which accommodates the left-hand drilling 3, but is a turned recess 19 whose diameter is equal to the outer diameter of the projection 11. Furthermore, whereas in the example shown in Figure 1 the securely centred location of the parts is obtained when the face 10 of the gearwheel 8 is in flush contact with the face 17 of the housing 1, in the example shown in Figure 3 the left-hand face 20 of the bush 18

comes into flush contact with the bottom 21 of the recess 19.

In the drive shown in Figure 4 there is no rotary pin shaft, but instead there is a stationary pin shaft 22 which is locked against rotation by the radial screws 23, 24 and located axially by a retainer ring 25. A rotary hub 27 is mounted on the stationary pin shaft 22 on two roller bearings 26. The rotary hub 27 has a cylindrical extension 11, corresponding essentially to the extension 11 on the bush 18 in Figure 3, which co-operates with a recess 19 in the housing 1. The recess 19 extends radially inwards into the retainer ring 25.

Removal of the stationary pin shaft 22 is preceded, essentially as already described above for the assemblies shown in Figures 1 and 2, by first of all pushing the rotary machine elements to the left by means of thrust screws. After that, the radial screws 23, 24 are loosened, and the stationary pin shaft 22 is withdrawn.

The present invention has practical applications of particular value as regard to heavy drives, as encountered for example in the drive systems of rolling mills.

WHAT WE CLAIM IS:—

1. A bearing assembly for a rotary machine element which is mounted on a removable pin shaft in a bearing housing, in which the rotary machine element and the bearing housing have on one of them a projection and on the other a corresponding recess, and the rotary machine element being movable axially relative to the bearing housing so that if it is desired that the pin shaft be withdrawn from the bearing housing the rotary machine element can be moved to bring the projection into engagement with the recess so that the machine element is held co-axial with the axis of rotation of the bearing assembly while the pin shaft is out of the housing.

2. A bearing assembly according to claim 1, having means for axially displacing the rotary machine element and for positively holding the projection and the recess in engagement with each other after the pin shaft is removed.

3. A bearing assembly according to claim 2, in which the means for axially displacing the rotary machine element comprises a number of thrust screws which are inserted axially through the wall of the bearing housing.

4. A bearing assembly according to any one of claims 1 to 3 in which the projection and the recess are cylindrical and are co-axial with the axis of rotation of the assembly.

5. A bearing assembly according to claim 1, substantially as described with reference to Figures 1 and 2, or Figure 3, or Figure 4 of the drawings.

For the Applicants:
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52 Chancery Lane,
London, W.C.2.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1968.
Published at The Patent Office, 25 Southampton Buildings, London, W.C.2,
from which copies may be obtained.

Fig. 1

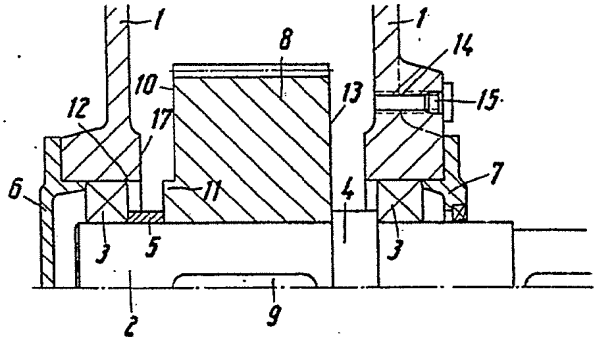
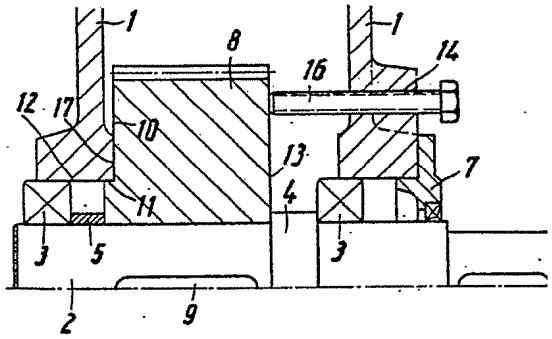


Fig. 2



1131377 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 1 & 2

Fig. 3

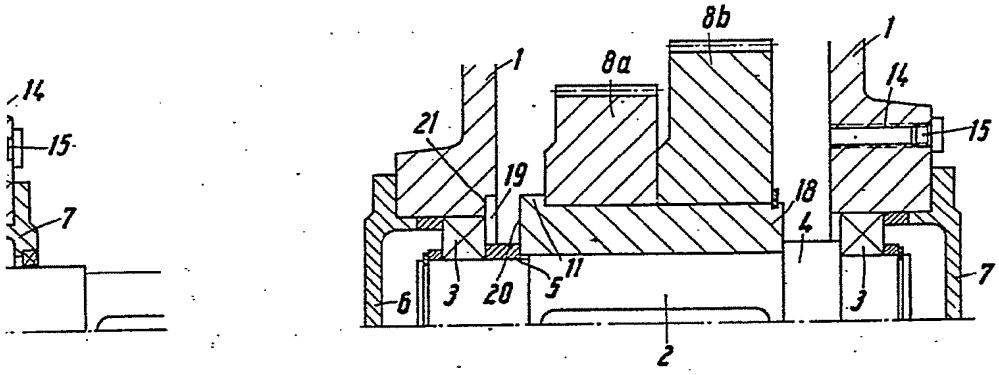
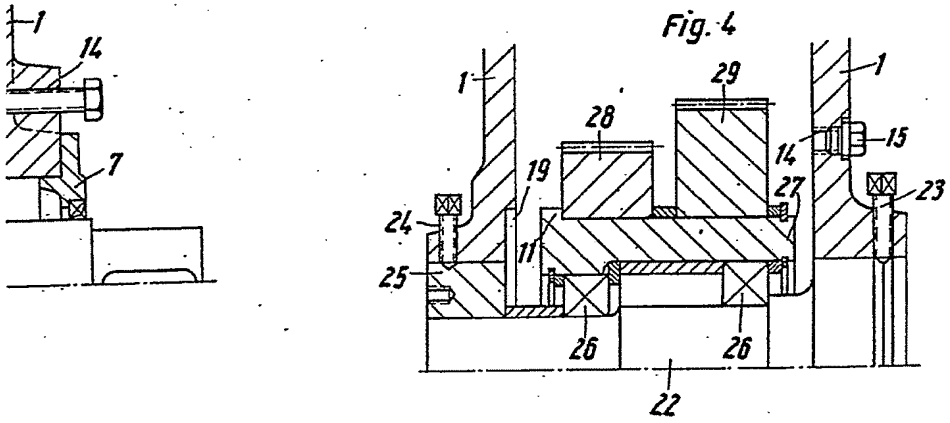


Fig. 4



1131377 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 1 & 2

Fig. 1

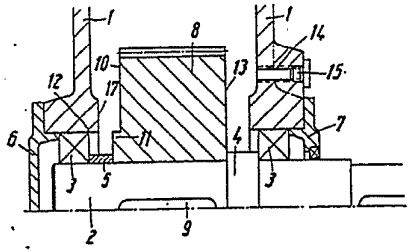


Fig. 2

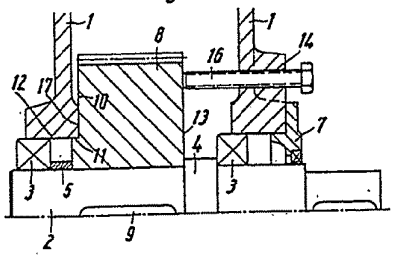


Fig. 3

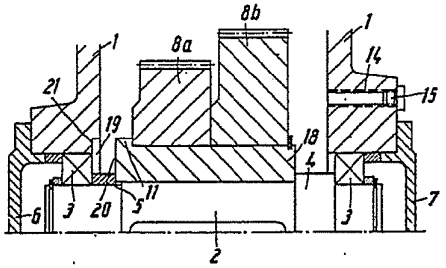


Fig. 4